

## PATENT SPECIFICATION

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## NO DRAWINGS

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(54) IMPROVEMENTS IN OR RELATING TO FLAVOURING  
COMPOSITIONS AND THEIR PREPARATION

(71) We, AJINOMOTO Co. INC., a corporation organized under the laws of Japan, of No. 7, 1-chome, Takara-cho, Chuo-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to flavouring compositions which have an aroma and taste similar to that of meat and which may be used for enhancing the flavour of foodstuffs, and to their preparation.

The beef flavour in many processed foods, e.g. soups and gravies, may be obtained by the incorporation therein of a product known as beef extract. However, the supply of beef extract is limited in spite of the large increase in demand by the processed foods industry, because it is prepared from an expensive raw material by a time-consuming and expensive process which generally comprises acid hydrolysis of meat tissue. The processors of food have long sought ways of overcoming these problems.

It has been reported that flavouring substances capable of imparting a savoury smell and taste to foodstuffs, particularly resembling those of cooked meat, may be obtained by the reaction of a monosaccharide with cysteine and/or cystine in the presence of water at an elevated temperature. It has been also reported that certain materials, e.g. creatinine, 5'-inosinic acid, 5'-guanylic acid and hydroxyproline, have a flavour similar to that of meat. However, we have found that the flavour and aroma of a mixture of these materials, was significantly different from the flavour and aroma of beef or any other meat.

It is an object of the present invention to provide a flavouring composition which has a favourable aroma and taste similar to that of a meat extract and which is stable.

According to one aspect of the present invention, there is provided a flavouring composition comprising a mixture of a first ingredient prepared by heating at least one

amino acid and a reducing sugar in water, and a second ingredient prepared by heating cystine and/or cysteine and a reducing sugar in a fat or oil. 50

According to another aspect of the present invention, there is provided a process for preparing a flavouring composition, which comprises mixing a first ingredient prepared by heating at least one amino acid and a reducing sugar in water, and a second ingredient prepared by heating cystine and/or cysteine and a reducing sugar in a fat or oil. 55

Preferably, the first ingredient is one prepared by heating a mixture of amino acids, containing at least glutamic acid, threonine, valine, lysine, alanine (or glycine), leucine (or isoleucine), methionine and proline, and a reducing sugar in water. The second ingredient is, as stated above, prepared by heating cystine and/or cysteine and a reducing sugar in a fat or oil. The mixture prepared by mixing the first and second ingredients may be employed in, for example, paste form or as a powder. 60

Though it has been known that the Maillard reaction products obtained by heating a mixture of a sulphur-containing amino acid and a reducing sugar have a characteristic flavour similar to some extent to meat, there are some defects in respect of the preparation and the quality of the product. For example, as the solubility of cystine or cysteine in water of neutral pH is very small, the velocity of the Maillard reaction under these conditions is very slow; to complete the Maillard reaction between cysteine and/or cystine and a reducing sugar within a few hours, it is necessary to keep the pH of the solution greater than 9.5 but then the aroma of the product becomes too stimulative; and when the Maillard reaction is carried out in water, most of the volatile materials of lower molecular weight which have an aroma and which are produced during the reaction, e.g. aldehydes, ketone, amines and alcohols, are easily driven off. 75

However, we have found that the combina-

tion of the first ingredient and the second ingredient, according to the present invention is important for preparing a flavouring composition having a meat-like aroma and taste.

5 The first ingredient provides a flavour and aroma based on comparatively high molecular weight substances and increases the savoury flavour known as "mouthfulness" which is specific to meat or beef extract.

10 The first ingredient may be prepared by heating the amino acid mixture preferably containing at least glutamic acid, threonine, valine, lysine, alanine (or glycine), leucine (or isoleucine), methionine and proline, and

15 reducing sugar in solution in water at from 60° to 100°C., preferably from 80° to 90°C. for 0.5 to 2 hours. The above-mentioned amino acid mixture may contain other amino acids apart from the eight specified, but the

20 total weight of the seven, excluding glutamic acid, should preferably be more than 15% by weight of the total quantity of all amino acids.

25 The eight amino acids are selected by a comparative study of the free amino acids included in meat extract, based on their resolving degree upon heat treatment and their contribution to the aroma. The precise quantitative balance between these seven amino acids cannot be readily determined but, according to our experiments, it is desirable that the amount of proline constitutes 1—10% of the total weight of the seven amino acids, the weight of methionine constitutes 0.1—2%, and the weight of valine constitutes 10—20%.

30 Examples of the reducing sugars employed include xylose, ribose and glucose. Any monosaccharide, including other pentoses, hexoses and alcohols, e.g. sorbitol, are also employable.

35 The amount of water in the Maillard reaction should preferably be 30 to 60%, based on the weight of the solid materials.

40 45 The second ingredient is prepared by heating cystine and/or cysteine, together with other amino acids if desired, with a reducing sugar in a fat or oil, generally at 100°—200°C., preferably 140°—160°C., for 5

50 minutes to 2 hours. The weight of the mixture of cystine and/or cysteine and the reducing sugar employed for the present reaction, is preferably 0.1—10%, based on the weight of the fat or oil. The weight ratio between the reducing sugar and the sulphur-containing amino acids generally depends upon the reaction conditions. However, the reducing sugar should normally be added in 0.01—100 parts based on one part of amino acid by weight.

55 60 The fats and oils employed in the present invention include fats and oils of vegetable and animal origin, including the common edible, as well as other, fats and oils, e.g. lard, tallow, fish oil, chrysalis oil, linseed oil, corn oil, sesame oil and peanut oil. Similar

65 effects are also obtained with phospholipids, and glycerides of fatty acids containing at least 11 carbon atoms.

70 The reducing sugars employed in the preparation of the second ingredient are the same as those mentioned for use in the preparation of the first ingredient.

75 Most of the volatile materials produced in the Maillard reaction in fats and oils are kept stably, compared with those produced in the Maillard reaction in water. These volatile materials, together with other fragrant materials derived from the fats and oils themselves, are very important for realizing a meat-like flavour and aroma. The fats and oils in which the Maillard reaction has been carried out may remain untreated in the second ingredient, or the residues formed during the Maillard reaction may be removed from the fat or oil before the second ingredient is mixed with the first.

80 85 The amount of the second ingredient used for preparing the flavouring composition of the present invention is normally less than 2% by weight of the first ingredient.

90 The mixture of the first and second ingredients is normally in a paste, but it may be dried to a powder by spray-drying method. The mixture may also contain a third ingredient, e.g. known seasoning materials or organic acids.

95 The present invention will now be illustrated by the following Examples.

#### EXAMPLE 1.

The following substances in parts by weight were mixed with stirring in a reaction vessel:

Monosodium glutamate	40	
Alanine	2	
Glycine	5	
Lysine	5	105
Isoleucine	4	
Threonine	2	
Valine	3	
Methionine	0.1	
Serine	3	110
Glucose	10	
Water	45	
Proline	1.5	

115 The pH of the solution was adjusted to 9.0 with 2N NaOH and the solution was heated at 80°C. for 1.5 hours. The reacted solution was then adjusted to pH 5.5 with 2N HCl. This solution was designated the first ingredient.

120 The second ingredient was prepared by heating a mixture containing, in parts by weight, 2 parts of cysteine, 1 part of xylose and 50 parts of hardened oil, at 150°C. for 15 minutes.

125 2 Parts by weight of the second ingredient were added to the first ingredient, and the

resulting mixture was designated "Sample". A control, flavouring material, designated "Control", was prepared in the same manner as mentioned above except that the mixture used in preparing the first ingredient also contained 0.2 part by weight of cysteine.

An organoleptic test in order to determine

the strength of the meat-like aroma and the preference of the flavour and aroma between the Sample and the Control, was performed with a panel of 50 members. The Sample and the Control were offered for testing as a 1% by weight solution. The results are shown in the following Table 1:

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TABLE 1

		Number of Persons who selected Sample	Number of Persons who selected Control
	The strength of the meat-like aroma	40	10
	The preference	35	15

20 0.5 Part of disodium inosinate, 10 parts of calcium lactate, 0.5 part of monosodium succinate, 0.2 part of creatinine, 5 parts of K<sub>2</sub>HPO<sub>4</sub> and 1 part of KCl were added to the Sample prepared as above, the parts being parts by weight.

25 The resulting modified flavouring composi-

tion and a beef extract available on the market were subjected to an organoleptic test. A preference test with respect to the flavour and aroma was carried out by a panel of 50 persons. The results were shown in the following Table 2:

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TABLE 2

		Number of Persons who selected modified flavouring composition	Number of Persons who selected beef extract on the market
40	Preference of aroma	24	26
	Preference of flavour	22	28
	Preference as a total	24	26

45 Note: The test was performed with a 1% by weight solution. NaCl was added to the modified flavouring composition so that its content became equivalent to that of the beef extract.

EXAMPLE 2  
The following substances in parts by weight 50 were mixed with stirring in a reaction vessel and heated at 85°C. for 40 minutes:—

55	Monosodium glutamate	50
	Alanine	2
	Lysine	8
	Leucine	2
	Threonine	4
	Valine	4
	Methionine	0.1
	Proline	1
60	Xylose	5
	Water	35

To the reacted mixture were added 3 parts by weight of a second ingredient prepared by heating 1 part by weight of cystine and 1 part by weight of ribose in 100 parts of lard 65 at 140°C. for 20 minutes. The resulting mixture was found to have a favourable flavour and aroma similar to that of meat.

This mixture was then diluted with 10

times its amount of water, and the resulting solution was mixed with dextrine in an amount equivalent to that of the all solid materials and 2% (by weight) of bone extract of beef. The resulting solution was dried to a powder in a spray-dryer of the nozzle type, the temperature at inlet of which was 200°C. and that at the outlet was 80°C. The resulting powder was found to be an excellent flavouring material, having a flavour and aroma similar to that of meat.

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WHAT WE CLAIM IS:—  
1. A flavouring composition comprising a mixture of a first ingredient prepared by heating at least one amino acid and a reducing sugar in water, and a second ingredient prepared by heating cystine and/or cysteine and a reducing sugar in a fat or oil.

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2. A composition as claimed in Claim 1, wherein the first ingredient is prepared by heating a mixture of at least glutamic acid, threonine, valine, lysine, alanine or glycine,

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leucine or isoleucine, methionine and proline, with a reducing sugar in water.

3. A composition as claimed in Claim 1 or 2, wherein the reducing sugar of either or both of the first and second ingredients is a hexose or a pentose.

4. A flavouring composition as claimed in Claim 1, substantially as described in either of the foregoing Examples.

10 5. A process for preparing a flavouring composition, which comprises mixing a first ingredient prepared by heating at least one amino acid and a reducing sugar in water, and a second ingredient prepared by heating cystine and/or cysteine and a reducing sugar in a fat or oil.

15 6. A process according to Claim 5, wherein the first ingredient is prepared by heating a mixture of at least glutamic acid, threonine, valine, lysine, alanine or glycine, leucine or isoleucine, methionine and proline, with a reducing sugar in water.

20 7. Process according to Claim 6, wherein the combined weight of threonine, valine, lysine, alanine or glycine, leucine or isoleucine, methionine and proline is more than 15% by weight of the amino acid mixture.

25 8. Process according to Claim 7, wherein proline constitutes 1 to 10%, methionine constitutes from 0.1 to 2% and valine constitutes from 10 to 20% by weight of said combined weight.

30 9. A process according to any one of Claims 5 to 8, wherein the reducing sugar, of the first and/or second ingredient, is a hexose or a pentose.

35 10. A process according to any one of Claims 5 to 9, wherein the first ingredient is prepared by heating an aqueous solution containing the amino acid(s) and reducing sugar

at from 60° to 100°C. for from 0.5 to 2 hours.

11. Process according to Claim 10, wherein the aqueous solution is heated at from 80 to 90°C.

45 12. Process according to Claim 10 or 11, wherein the weight of water in the aqueous solution is from 30 to 60% based on the weight of the solid materials.

13. A process according to any one of Claims 5 to 12, wherein said second ingredient is prepared by heating cystine and/or cysteine and the reducing sugar in a fat or oil at from 100° to 200°C. for from 5 minutes to 2 hours.

50 14. Process according to Claim 13, wherein the cystine and/or cysteine and the reducing sugar is heated at from 140 to 160°C.

55 15. A process according to Claim 13 or 14, wherein, after cystine and/or cysteine is heated with a reducing sugar in a fat or oil, any residue formed in the fat or oil is removed before the first and second ingredients are mixed.

60 16. A process according to any one of Claims 5 to 15, wherein the composition obtained by mixing the first and second ingredients is dried to a powder.

65 17. Process according to Claim 5, substantially as described in either of the foregoing Examples.

70 18. A flavouring composition whenever prepared by the process claimed in any one of Claims 5 to 17.

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